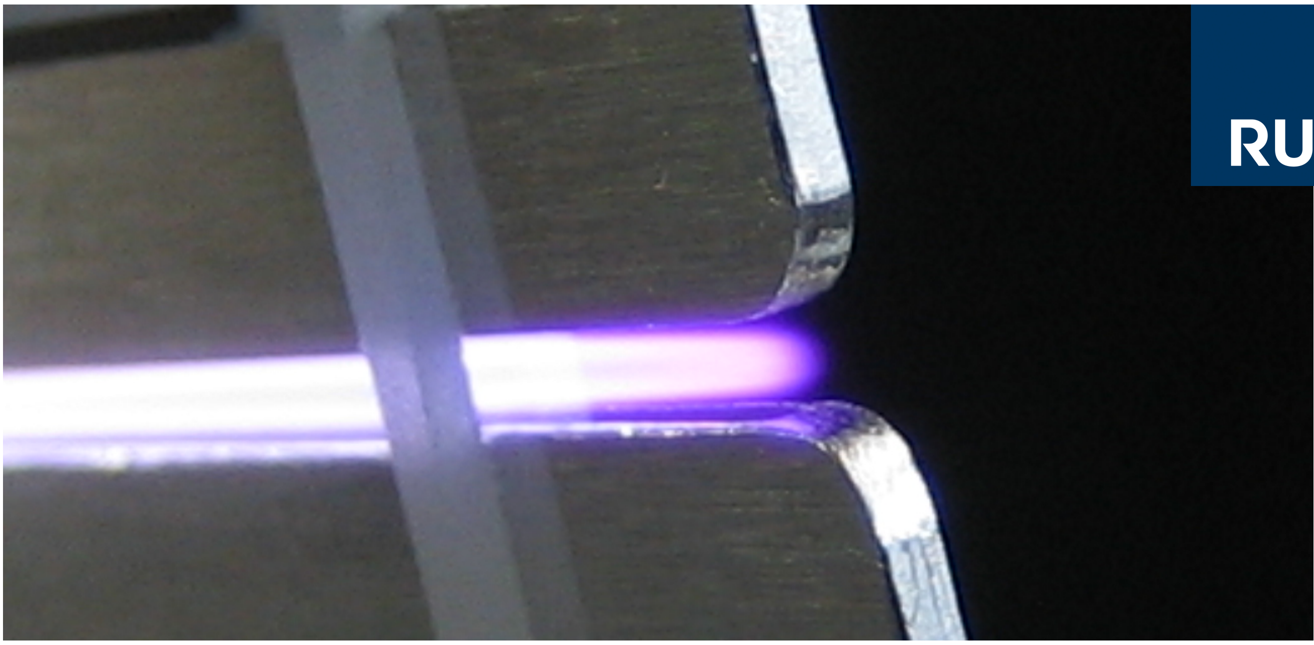

International Workshop

Young Professionals in Microplasma Research

Nov. 24-26th, 2014

Venue: Conference Center, Room 3,
Ruhr-University Bochum (RUB), Bochum, Germany

The aim of this Workshop is to bring together **young professionals in the field of non-equilibrium atmospheric plasmas**. Young researchers are encouraged to exchange their expertise and knowledge in the field of microplasmas, reactive plasma jets, plasma simulation and modelling in a conference format organized and led by young researchers.

A special session will be devoted to materials processing using microplasmas.

The workshop is supported by the German Science Foundation under the framework of the research unit “FOR 1123: Physics of Microplasmas“, the Research Department “Plasmas with Complex Interctions”, and by the Leverhulme International Network “Atmospheric Plasma Materials processing for Energy application”. Therefore, no conference fee will be asked.

For more information please visit

www.for1123.rub.de ***or*** ***www.plasmamate.net***

RESEARCH DEPARTMENT
Plasmas with Complex Interactions
DFG FORSCHERGRUPPE 1123
Physics of Microplasmas

The Leverhulme Trust

Monday, Nov. 24th 2014

10:00-10:10	**Welcome** *Jan Benedikt* *Ruhr-Universität Bochum*

Session: Diagnostics / Laser (Steffen Marius Meier)

10:10-10:40	**Constricted, 'y-mode-like' discharge in the self-pulsing operation regime of the μ-APPJ** *Daniel Schröder* *Ruhr-Universität Bochum*
10:40-11:05	**Non-thermal Atmospheric Pressure Plasma Jet Operated in Noble Gases** *Jiri Sperka* *Masaryk University*
11:05-11:30	**He-Metastable Densities and N2 Afterglow in the pulsed constricted mode of the μAPPJ RF Microjet (μAPPJ)** *Stefan Spiekermeier* *Ruhr-Universität Bochum*
11:30-11:55	**Thomson scattering measurments in a ns pulsed atmospheric pressure plasma jet** *Christian Schregel* *Ruhr-Universität Bochum*
11:55-13:00	Lunch at Mensa

Session: Diagnostics general (Daniel Schröder)

13:00-13:30	**Power coupling and electrical characterization of a radio-frequency micro-APPJ** *Daniil Marinov* *LPP Ecole Polytechnique*
13:30-13:55	**Controlling inception and breakdown characteristics in pulsed dielectric barrier discharges by variable pulse width - influence of the pre-phase** *Hans Höft* *INP Greifswald*
13:55-14:20	**Pulse microwave capillary discharge in atmospheric presure argon** *Aleksey Davydov* *Prokhorov General Physics Institute, Russian Academy of Sciences*
14:20-14:40	Break

Session: Plasma / Liquid (Jan Benedikt)

14:40-15:05	**Influence of the water electrospray on the DC corona discharge** *Branislav Pongrác* *Faculty of Mathematics, Physics and Informatics, Comenius University Bratislava*
15:05-15:30	**Imaging of Sparks and Streamers in Water** *Simon Hübner* *Ruhr-Universität Bochum*
15:30-15:55	**Electron paramagnetic resonance spectroscopy: A valuable tool for the analysis of plasma-induced species in liquids** *Yury Gorbanev* *University of York*
15:55-16:10	walk to NB
16:00-18:30	**Labtours EP2, EP5**
18:30	**Informal welcome reception at VZ**

Influence of the water electrospray on the DC corona discharge

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1. Introduction

One of the potential applications of water electrospray in combination with the discharge is the decontamination of water polluted with organic and microbial pollutants. The presence of the electrical discharge generating non-thermal plasma in the spraying area allows for very efficient mass transfer of plasma-generated species into water [1].
We investigated the effect of the water electrospray in combination with positive DC corona discharge. We observed a significant effect of the discharge on the electrospray behavior and vice versa [2-5].

2. Imaging of corona generation during the intermittent electrospray

We investigated the corona discharge generation during the electrospray of water. Fig. 1 shows different stages of the electrospraying event and the discharge propagation from 0 to 3 ms.

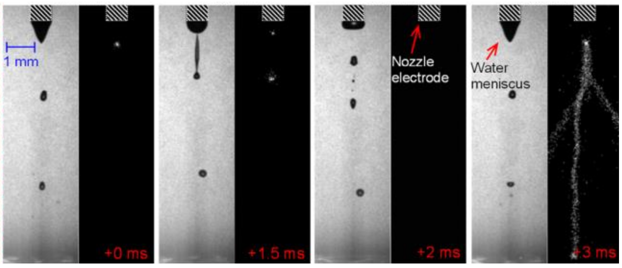

Fig. 1: iCCD time sequence images of spindle mode electrospraying of water with corona discharge.

The glow corona is first visible at the tip of the water cone (0 ms). As this cone gradually elongates and creates the filament which propagates towards the grounded electrode, the glow corona remains present at the tip of the filament and propagates with it (1.5 ms). After the detachment of the water fragment, and the contraction of the water meniscus back towards the nozzle, the glow corona disappears (2 ms). Finally, after a 3 ms, a new cone is formed, and the filamentary discharge occurs from the cone tip.
We have shown that the appearance of the corona on the water filament tip is primarily the electric field effect due to the various curvatures of this water filament tip [4].

3. Influence of the water conductivity on the corona properties

Depending on the water electrical conductivity (K), various jet properties were observed: pointy, prolonged, and fast spreading water filaments for lower K; in contrast to rounder, broader, and shorter quickly disintegrating filaments for higher K.
When the K increases, the breakdown voltage for corona-to-spark transition decreases (Fig. 2).

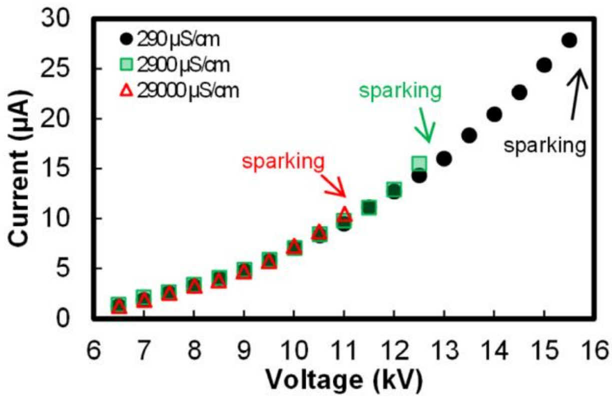

Fig. 2: I-V characteristics of the electrospray with corona discharge. Different breakdown voltages for corona-to-spark transition are due to different conductivity effect.

Since the highly conductive liquid acts as a good conductor, the electric field is stronger on the highly conductive water meniscus. The discharge is thus permitted to occur at the liquid surface and the discharge activity on the water filament tip is then enhanced as the filament proceeds toward the ground electrode.
For poorly conductive liquids, the liquid acts more as an insulator and the electrical resistance of the growing water filament suppresses the corona activity on its surface. So the discharge is forced to occur on the metal electrode. Subsequently, the spark does not occur until the higher voltage [5].

Acknowledgement
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References

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